

# Comparative Demographic and Clinical Profile of Preeclamptic and Normal Pregnant Women in the Third Trimester

Nasima Akhter<sup>1\*</sup>, Md. Azharur Rahman<sup>2</sup>, Ashik Mahmud<sup>3</sup>, Saima Rahman<sup>4</sup>, Rabab Sultana<sup>5</sup>

<sup>1</sup>Dr. Nasima Akhter, Assistant Professor, Department of Gynaecology and Obstetrics, Brahmanbaria Medical College, Brahmanbaria, Bangladesh

<sup>2</sup>Dr Md. Azharur Rahman, Senior Consultant, Department of Surgery, 250 bed General Hospital, Brahmanbaria, Bangladesh

<sup>3</sup>Dr. Ashik Mahmud, Associate Professor, Department of Surgery, Brahmanbaria Medical College, Brahmanbaria, Bangladesh

<sup>4</sup>Dr Saima Rahman, Assistant Professor, Department of Gynaecology and Obstetrics, Brahmanbaria Medical College, Brahmanbaria, Bangladesh

<sup>5</sup>Dr. Rabab Sultana, Assistant Professor, Department of Oncology, Bangladesh Medical College, Dhaka, Bangladesh

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\*Corresponding author: Nasima Akhter

Dr. Nasima Akhter, Assistant Professor, Department of Gynaecology and Obstetrics, Brahmanbaria Medical College, Brahmanbaria, Bangladesh

## Abstract

**Background:** Preeclampsia is a pregnancy-specific, multi-system disorder characterized by elevated blood pressure and proteinuria after 20 weeks of gestation. Its exact etiology remains unknown, and globally, it stands as a prominent cause of maternal and infant morbidity and mortality. This study aimed to assess the comparative demographic and clinical profile of preeclamptic and normal pregnant women in the third trimester. **Methods:** This case-control study took place in Bangabandhu Sheikh Mujib Medical University Hospital and Dhaka Medical College Hospital, Dhaka, Bangladesh, spanning from July 2011 to June 2012. The study enrolled 100 pregnant women, with 50 cases diagnosed with preeclampsia and 50 controls representing normal pregnant women. Data analysis was conducted using SPSS version 23.0. **Results:** The mean ages of cases ( $25.8 \pm 4.4$  years) and controls ( $27.1 \pm 3.1$  years) were similar ( $P=0.177$ ). A predominant proportion of cases (74%) and controls (66%) belonged to a lower social class ( $P=0.383$ ). BMI assessment showed no significant difference ( $P=0.645$ ). Most participants in both groups were preterm ( $P=0.235$ ) and primigravida ( $P=0.422$ ). The case group exhibited significantly higher mean serum ferritin than the control group ( $P<0.001$ ). Hemoglobin and hematocrit levels showed no significant differences ( $P=0.761$  and  $P=0.231$ , respectively). Elevated serum ferritin ( $>20$  ng/ml) was prevalent in 76% of cases and 44% of controls ( $P=0.001$ ). The odds of elevated serum ferritin in preeclampsia were approximately 4 times higher than in normal pregnancies (95% CI=1.7–9.5). Variations in serum ferritin levels across gestational ages are illustrated. **Conclusion:** The study found no significant correlation between preeclamptic and normal pregnant women's demographic and clinical status in the third trimester, except for serum ferritin levels. Further research is needed to obtain a clearer understanding of these relationships.

**Keywords:** Demographic profile, Clinical, Preeclampsia, Normal pregnant, Third-trimester.

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## 1. INTRODUCTION

Preeclampsia is a serious condition exclusive to pregnant and postpartum women, posing significant concerns for both patients and healthcare professionals [1]. This multisystem disorder lacks a known cause and is specific to pregnant women [2]. While the condition typically resolves after delivery, the timing of delivery is crucial, balancing the risk of complications for the baby against the potential dangers of delaying delivery [3].

Serum ferritin serves as a reliable indicator of overall body iron status, and low concentrations are indicative of iron deficiency. However, elevated ferritin levels do not always imply excess iron. Ferritin is a key iron storage protein present in various tissues and plasma [4]. Serum ferritin concentration is closely linked to bone marrow iron stores, showing changes before alterations in transferrin saturation, serum iron, or hemoglobin concentration. During pregnancy, serum ferritin peaks at

12-16 weeks, subsequently declining as gestation progresses, reaching its lowest point in the third trimester [5]. Studies indicate that the lowest quartile of ferritin concentrations at 28-30 weeks is associated with a reduced risk of preeclampsia, premature rupture of membranes (PROM), and neonatal intensive care unit (NICU) admission [6]. Elevated ferritin and iron levels in preeclampsia and eclampsia act as pro-oxidants, promoting lipid peroxidase activity and inducing damage to endothelial cells. Evidence suggests that increased serum ferritin plays a pathogenic role in the development of preeclampsia, acting as an acute phase reactant [7]. A lower ferritin level during 28-30 weeks may be associated with a decreased incidence of preeclampsia [9].

## 2. METHODOLOGY

This case-control study was conducted in the Department of Obstetrics & Gynaecology at Bangabandhu Sheikh Mujib Medical University Hospital and Dhaka Medical College Hospital, Dhaka, Bangladesh, spanning from July 2011 to June 2012. The study included a total of 100 pregnant women in their third trimester as study subjects, divided into two groups. The case group comprised 50 pregnant women with preeclampsia, while the control group consisted of 50 pregnant women without preeclampsia. Sample selection utilized a purposive sampling technique, and the study received approval from the ethical committee of the mentioned hospitals. Before data collection, proper written consent was obtained from all participants. The study's exclusion criteria comprised pregnant individuals with iron deficiency anemia, hemoglobinopathies, known cases of liver disease, chronic hypertension, renal disease, gestational diabetes, diabetes mellitus, a history of preeclampsia, multiple pregnancies, and those who did not provide consent to participate. Data analysis was conducted using the SPSS version 23.0 program, with a P value <0.05 considered as the threshold for statistical significance.

## 3. RESULT

In this study, regarding the age distribution between groups, more than three-quarters (76%) of the cases and the majority (86%) of the controls were over 30 years old. The mean ages of cases ( $25.8 \pm 4.4$  years) and controls ( $27.1 \pm 3.1$  years) were almost similar ( $P=0.177$ ). Regarding the distribution of socioeconomic status among cases and controls, almost three-quarters (74%) of the cases and two-thirds (66%) of the controls belonged to the lower social class ( $P=0.383$ ). The majority of study subjects, comprising 82% in the case group and 84% in the control group, had a normal BMI, with no significant intergroup difference ( $P=0.645$ ). In terms of gestational age, 82% in the cases group and 72% in the control group were preterm (< 37 weeks of gestation) in this study ( $P=0.235$ ). In the observed distribution, 42% of cases and 50% of controls were primigravida, while the remaining participants in each

group were multigravida ( $P=0.422$ ). In this study, the distribution of cases by the grading of proteinuria showed that 50% had mild proteinuria, 20% had moderate proteinuria, and the remaining 30% had severe proteinuria. In this study, 64% of preeclamptic cases were classified as mild, while 36% were severe. The mean serum ferritin in the case group was significantly higher than in the control group ( $P < 0.001$ ). There was no significant difference between the cases and control groups regarding the levels of hemoglobin and hematocrit ( $P=0.761$  and  $P=0.231$ , respectively). In this study, over three-quarters (76%) of the case group had elevated serum ferritin (> 20 ng/ml), while only 44% of the control group exhibited the same ( $P=0.001$ ). The odds of having elevated serum ferritin in women with preeclampsia were approximately 4 times higher than in normal pregnant women (95% CI = 1.7 – 9.5). In this study, the mean serum ferritin level in the severe preeclampsia group was 192.8 ng/ml, in the mild preeclampsia group it was 86.1 ng/ml, and in normal pregnant women, it was 21.7 ng/ml, demonstrating a correlation between the severity of preeclampsia and higher serum ferritin levels ( $P < 0.001$ ). The variations in serum ferritin levels in both case and control groups at different gestational ages are depicted.

**Table 1: Age distribution of participants**

Age (Year)	Case		Control		P-value
	n	%	n	%	
	(n = 50)		(n = 50)		
< 20	5	10%	0	0%	0.177
20 – 30	7	14%	7	14%	
> 30	38	76%	43	86%	
Mean $\pm$ SD	25.8 $\pm$ 4.4		27.1 $\pm$ 3.1		

**Table 2: Socioeconomic status**

Status	Case		Control		P-value
	(n = 50)		(n = 50)		
	n	%	n	%	
Lower class	37	74%	33	66%	0.383
Middle class	13	26%	17	34%	

**Table 3: Distribution of BMI**

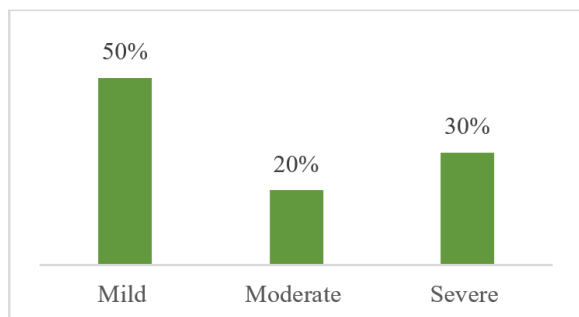
BMI (kg/m <sup>2</sup> )	Case		Control		P-value
	(n = 50)		(n = 50)		
	n	%	n	%	
< 25	41	82%	42	84%	0.645
$\geq$ 25	9	18%	8	16%	
Mean $\pm$ SD	24.5 $\pm$ 1.6		24.4 $\pm$ 1.8		

**Table 4: Gestational age distribution**

Gestational age	Case		Control		P-value
	(n=50)		(n=50)		
	n	%	n	%	
< 37 weeks	41	82%	36	72%	0.235
$\geq$ 37 weeks	9	18%	14	28%	

**Table 5: Gravidity distribution**

Gravida	Case		Control		P-value
	(n = 50)		(n = 50)		
	n	%	n	%	
Primigravida	21	42%	25	50%	0.422
Multigravida	29	58%	25	50%	

**Figure 1: Proteinuria in case group****Table 6: Hematological findings**

Hematological findings			
Parameters	Case		P-value
	(n=50)		
	Mean $\pm$ SD		
Hemoglobin(g/dl)	10.9 $\pm$ 0.8	11.0 $\pm$ 0.9	0.761
Hematocrit (%)	32.4 $\pm$ 1.8	31.6 $\pm$ 1.5	0.231
S. ferritin(ng/ml)	124.5 $\pm$ 24.8	21.7 $\pm$ 1.4	<0.001

**Table 7: Risk of having raised s. ferritin**

Serum level of ferritin(ng/ml)					
Parameters	Case		Control		P-value
	(n = 50)		(n = 50)		
	n	%	n	%	
> 20	38	76%	22	44%	0.001
$\leq$ 20	12	24%	28	56%	

## 4. DISCUSSION

This study aimed to compare the demographic and clinical profiles of preeclamptic and normal pregnant women in the third trimester. In terms of age distribution, more than three-quarters (76%) of cases and the majority (86%) of controls were above 30 years old. The mean ages of cases (25.8  $\pm$  4.4 years) and controls (27.1  $\pm$  3.1 years) were similar (P=0.177). Hubel [10] (1989) also found no difference in age distribution between case and control groups. Regarding the distribution of socioeconomic status, approximately three-quarters (74%) of cases and two-thirds (66%) of controls belonged to the lower social class (P=0.383). Most (74%) of the cases and the controls (66%) belonged to the lower social class (P=0.383). Similar findings were found in another study [11]. The majority of the study subjects (82% in the case group and 84% in the control group) had a normal BMI, with no significant intergroup difference (p = 0.645). In terms of gestational age, 82% in the cases group and 72% in the control group were preterm (<37 weeks of gestation) (p = 0.235). Another study [12] observed that the majority (89.4%) of

preeclamptic women had gestational age <37 (preterm) in the case group and 30 (80.9%) in the control group, with a mean gestational age of 34.65  $\pm$  1.53 weeks in cases and 35.08  $\pm$  1.73 weeks in controls. The difference was statistically not significant (P>0.05) between the two groups. In this present study, it was observed that 42% of cases and 50% of controls were primigravida, and the rest of the respective groups were multigravida (P=0.422). The cases and control groups were matched in respect of gravidity. Paul *et al.*, observed that 65.0% had primigravida in the case group and 70.0% in the control group (P>0.05), which is consistent with the current study [13]. In the present study, according to the distribution of cases by the grading of proteinuria, of the 50 cases, 50% had mild proteinuria, 20% had moderate proteinuria, and the rest 30% had severe proteinuria. Based on the severity, 64% of preeclampsia in the current study were classified as mild, and 36% were classified as severe preeclampsia. In a previous study [12], it was observed that the majority (94.1%) of patients had serum ferritin levels >120 (ng/ml) in severe preeclampsia, 63.3% in mild preeclampsia, and 36.2% in the control group. The differences were statistically significant (P<0.05) between the severities of preeclampsia with serum ferritin. The mean serum ferritin in the case group was observed to be staggeringly elevated compared to the control counterpart (P<0.001). There was no significant difference between the cases and control groups concerning the level of hemoglobin and hematocrit (P=0.761 and P=0.231). Comparable results were seen in a study conducted by Zafar and Iqbal [14]. In this study, over three-quarters (76%) of the case group exhibited elevated serum ferritin (>20 ng/ml) compared to 44% in the control group (P=0.001). The likelihood of having elevated serum ferritin in women with preeclampsia was estimated to be 4 times higher (95% CI=1.7–9.5) than in normal pregnant women. Another study [15] suggested remarkably higher serum iron, ferritin, and transferrin saturation rates and lower TIBC levels in preeclamptic patients compared to normal subjects. Taheripanah [11] found that 45.5% of preeclamptic patients had abnormal ferritin levels, higher than in our study. The mean serum ferritin level in severe preeclampsia was 192.8 ng/ml, mild preeclampsia was 86.1 ng/ml, and normal pregnant women was 21.7 ng/ml, indicating that greater severity of preeclampsia correlates with higher serum ferritin levels (P<0.001). Changes in serum ferritin levels at different gestational ages in case and control groups are illustrated. In another study [16], the mean serum ferritin level in the case and control groups was 100.03  $\pm$  123.52  $\mu$ gm/L and 31.53  $\pm$  20.86  $\mu$ gm/L, respectively, which is highly significant (P<0.001).

### Limitation of the Study:

The study was limited to a single center and had a small sample size. Furthermore, it was conducted over a brief period. As a result, the findings from this study may not provide an accurate representation of the overall situation throughout the entire country.

## 5. CONCLUSION

The study revealed no significant correlation between the demographic and clinical status of preeclamptic women and those with normal pregnancies in the third trimester, except for serum ferritin levels. This suggests that factors beyond the commonly studied demographic and clinical parameters may contribute to the development of preeclampsia, and further research is necessary to obtain a clearer understanding of these relationships. Investigating additional variables and exploring the underlying mechanisms associated with serum ferritin levels in the context of preeclampsia could provide valuable insights into the complex nature of this pregnancy-related condition. Continued research efforts may help refine risk assessment models and improve our ability to identify, manage, and potentially prevent preeclampsia.

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